



## Brief Communication

## Linguistic validation of the Sleep Disturbance Scale for Children (SDSC) in Iranian children with Persian language

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## ABSTRACT

**Objective:** The aim of this study was to have a linguistic validation of the Sleep Disturbance Scale for Children (SDSC) in Iranian children with Persian language.**Methods:** The study included a randomly selected sample of children, aged 6–15 years, from three primary and secondary schools located in Isfahan City, Iran. Following the forward–backward translation method, parents completed the SDSC as well as the Pediatric Quality of Life Inventory (PedsQL™). Reliability (Cronbach's  $\alpha$ ) and convergent validity (item–subscale and subscale–total correlations) were assessed. The association of SDSC scores with PedsQL scores was evaluated for construct validity.**Results:** One hundred children were studied; mean age,  $9.36 \pm 2.58$  years, 68 girls. Scale Cronbach's  $\alpha$  was 0.82, ranging from 0.40 for 'disorder of arousal' to 0.86 for 'sleep hyperhidrosis' subscales. Convergent validity was acceptable according to the corrected item–subscale correlations ( $r = 0.22$ – $0.76$ ) and corrected subscale–total correlations ( $r = 0.30$ – $0.50$ ). The SDSC total score as well as its subscales, except the 'disorder of arousal', were associated with the total PedsQL score and its factors ( $r = -0.20$  to  $-0.64$ ).**Conclusion:** The overall psychometric properties of the Persian version of the SDSC seem to be appropriate in Iranian children.

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## 1. Introduction

Sleep disorders are widespread among children with increasing prevalence over time [1]. Sleep disturbances can affect the physical, behavioral, and cognitive functioning of children with potential long-term effects [2]. Emotional and cognitive disorders associated with sleep disturbances expose children to educational and learning problems [3]. Hence, early diagnosis of sleep problems in children is of great importance.

Sleep questionnaires are useful screening tools as they may provide uniform and reproducible standard measurements using an inexpensive and accurate method. Several questionnaires have been designed for evaluation of children's sleep disorders. The Sleep Disturbance Scale for Children (SDSC), developed by Bruni et al. [4], is among the few sleep questionnaires based on the psychometric tool development requirements [5]. The SDSC is

designed to evaluate six groups of common sleep disorders in children aged 6–15 years including disorder of initiating and maintaining sleep (DIMS), sleep-disordered breathing (SBD), disorder of arousal (DA), sleep–wake transition disorder (SWTD), disorders of excessive somnolence (DOES), and sleep hyperhidrosis (SHY). The questionnaire has appropriate reliability and validity as well as diagnostic accuracy [4]. It has been translated and validated in different populations and used in epidemiologic as well as clinic-based studies [5,6]. The aim of this study was to have a linguistic validation of the SDSC and determination of its psychometric properties in Iranian children with Persian language.

## 2. Methods

## 2.1. Setting

This linguistic validation study was performed with schoolchildren, aged 6–15 years, in Isfahan City, Iran. According to the general recommendations [7], 20 cases were considered for the pilot study and 100 for the main study. The pilot study was carried

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**Table 1**Cronbach's  $\alpha$  for the total scale and its subscales' and corrected item–scale, item–total, and subscale–total correlations.

Scales and items	Subscale Cronbach's $\alpha$ ; and if item deleted	Total Cronbach's $\alpha$ if item deleted	Corrected item–subscale correlation	Corrected item–total and subscale–total correlations
DIMS	0.67			0.46
1	0.70	0.82	0.20	0.13
2	0.62	0.81	0.42	0.31
3	0.61	0.80	0.45	0.41
4	0.56	0.80	0.60	0.47
5	0.62	0.81	0.42	0.30
10	0.66	0.81	0.25	0.30
11	0.64	0.80	0.35	0.50
SBD	0.56			0.45
13	0.30	0.81	0.50	0.23
14	0.52	0.81	0.36	0.35
15	0.60	0.80	0.36	0.43
DA	0.40			0.42
17	0.33	0.81	0.23	0.29
20	0.32	0.81	0.22	0.29
21	0.24	0.81	0.27	0.30
SWTD	0.65			0.50
6	0.60	0.81	0.42	0.30
7	0.63	0.81	0.35	0.29
8	0.61	0.81	0.37	0.27
12	0.70	0.80	0.36	0.54
18	0.54	0.80	0.57	0.35
19	0.57	0.81	0.48	0.27
DOES	0.80			0.33
22	0.77	0.80	0.50	0.38
23	0.75	0.80	0.59	0.45
24	0.76	0.81	0.54	0.27
25	0.70	0.80	0.74	0.51
26	0.77	0.80	0.54	0.35
SHY	0.86			0.30
9	–	0.80	0.76	0.34
16	–	0.81	0.76	0.33

DIMS, disorders of initiating and maintaining sleep; SBD, sleep-disordered breathing; DA, disorders of arousal; SWTD, sleep–wake transition disorders; DOES, disorders of excessive somnolence; SHY, sleep hyperhidrosis.

out in a general pediatrics clinic of a university hospital and samples were recruited consecutively. The main study was conducted in three primary and secondary schools located in different zones of the city, and samples were recruited by clustered random sampling. The study was approved by the Ethics Committee of the Isfahan University of Medical Sciences and consent was obtained from parents to participate.

## 2.2. Linguistic validation

Translation and linguistic validation of the SDSC were performed by the standard method of forward–backward translation [7]. In a pilot study with 20 participants, parents completed the translated SDSC and responded to a set of questions that assessed the level of difficulty and readability of the questionnaire. Based on the pilot study results and feedback from the original developer, the final Persian version of the SDSC (SDSC-P) was produced and used in the main study.

## 2.3. Assessments

An envelope containing the study questionnaires along with a cover letter and consent form was given to schoolchildren included in the study. The children were asked to give the envelope to one of their parents (or caretakers) and bring it back to the school after completing the questionnaires.

### 2.3.1. Sleep Disturbance Scale for Children

The SDSC contains 26 Likert-type questions evaluating six groups of prevalent sleep disorders as well as providing an overall measure in children. The questionnaire is completed by a parent or a caregiver, and evaluates the child's situation during the last 6 months. The first two questions evaluate sleep quantity and onset time. Other questions assess the frequency of certain sleep-related behaviors, scoring from 1 (never) to 5 (always). Total questionnaire score ranges from 26 to 130, with higher scores indicating more acute sleep disturbance [4].

**Table 2**

Spearman's correlation of the quality-of-life scores with overall sleep scale and the subscales scores.

PedsQL™	SDSC total	DIMS	SBD	DA	SWTD	DOES	SHY
Total score	–0.64*	–0.50*	–0.30*	–0.17	–0.46*	–0.53*	–0.30*
Physical functioning	–0.54*	–0.33*	–0.25*	–0.17	–0.44*	–0.42*	–0.35*
Emotional functioning	–0.55*	–0.49*	–0.21*	–0.10	–0.43*	–0.37*	–0.30*
Social functioning	–0.43*	–0.45*	–0.20*	–0.06	–0.28*	–0.33*	–0.27*
School functioning	–0.44*	–0.31*	–0.30*	–0.16	–0.28*	–0.43*	–0.03

PedsQL, Pediatric Quality of Life Inventory; SDSC, Sleep Disturbance Scale for Children; DIMS, disorders of initiating and maintaining sleep; SBD, sleep-disordered breathing; DA, disorders of arousal; SWTD, sleep–wake transition disorders; DOES, disorders of excessive somnolence; SHY, sleep hyperhidrosis.

\*  $P < 0.001$ .

### 2.3.2. Pediatric Quality of Life Inventory (PedsQL™)

The PedsQL is designed to evaluate the quality of life in children aged 5–18 years. This questionnaire consists of 23 Likert-type items in four subscales of physical, emotional, social, and school functioning. The questionnaire is completed by parents or caregiver, and considers the health condition of the child during the previous month. Total PedsQL score as well as subscales' score range from 0 to 100 in which the higher score indicates better quality of life [8]. The Persian version of the questionnaire was used with appropriate psychometric characteristics (Cronbach's  $\alpha > 0.7$ ) [9].

### 2.4. Statistical analyses

Data were analyzed using the SPSS software (version 16.0, SPSS Inc., Chicago, IL, USA). Reliability was assessed by determining the internal consistency (Cronbach's  $\alpha$ ) of the scale. Convergent validity was assessed by determining corrected item–subscale and subscale–total correlations. The associations between the SDSC scores and PedsQL scores were evaluated for construct validity. In all analyses,  $P < 0.05$  was considered significant.

## 3. Results

The results of the pilot study showed an overall appropriate translation. Out of 121 distributed questionnaires in the main study, 100 questionnaires were returned with complete responses including data from 68 girls and 32 boys with mean age of  $9.36 \pm 2.58$  years.

### 3.1. Psychometric properties of the SDSC-P

Participants responded to 99.3% of the SDSC items. Missing data for each item ranged from 1% to 3%. Cronbach's  $\alpha$  for the total questionnaire was 0.82, ranging from 0.40 for DA subscale to 0.86 for SHY subscale (Table 1). Corrected item–total and item–subscale correlations were  $>0.3$  for most of the items and  $>0.2$  for all items except item 1 (Table 1). All of the SDSC subscales were correlated with the scale total score; corrected correlations of 0.30–0.50 (Table 1). The total SDSC score and all of its subscales, except the DA subscale, were associated with the PedsQL total score as well as its subscales ( $r = -0.20$  to  $-0.64$ ) (Table 2).

## 4. Discussion

According to the study results, the overall psychometric properties of the SDSC-P seem to be appropriate. Cronbach's  $\alpha$  for the scale in our study ( $\alpha = 0.82$ ) was similar to that in the original study ( $\alpha = 0.79$ ) [4]. Although the SDSC is used in studies on populations with different languages including English [10], Deutsch [11], French [12], and Finnish [13] languages, there is only one available report on its psychometric properties in Brazilian Portuguese language [14]. Ferreira et al. validated the Brazilian version of the SDSC in a clinical sample and found a scale Cronbach's  $\alpha = 0.78$ , ranging from 0.56 for DOES to 0.82 for SHY subscales [14]. We found the lowest Cronbach's  $\alpha$  for the DA subscale ( $\alpha = 0.40$ ). It might be related to the low prevalence of these disorders in our general population [15]. The DA subscale has three items evaluating sleepwalking, sleep terrors, and nightmares. In our study, 80–94% of parents responded 'never' to these items. It is possible that parents under-recognized or under-reported such sleep problems for their children [10].

With regard to the scale validity, the corrected item–total and item–subscale correlations were  $>0.3$  for most of the items and  $>0.2$  for all items except item 1 which evaluates sleep duration.

These results were similar to that of the original study; item–total correlation ranged from 0.17 to 0.46 [4]. In our study, children's sleep duration of  $<5$ , 5–7, 7–8, 8–9, and 9–11 h per day was reported by 2%, 11%, 42%, 33%, and 12% of the parents, respectively. There is a high inter-individual variability in the sleep need in children, and sleep duration per se may not clearly correlate with other sleep disturbances. In addition, parental reports by questionnaire may not be accurate regarding children's sleep patterns (bed-times, wake times, sleep duration) [16]. This could be responsible for the observed low item–total and item–subscale correlations for item 1. Regarding the convergent validity, all of the SDSC subscales were strongly correlated with the total scale. Similar to the original study as well as to the Brazilian study [4,14], our results indicate an acceptable convergent validity of the SDSC.

Sleep disorder is associated with children's physical and mental functioning and their quality of life [2,3,11,17]. We considered such association for evaluating the construct validity of the SDSC and it was confirmed in our study by correlation between the total SDSC score with physical, emotional, social, and school functioning. Regarding the SDSC factors, all of the SDSC-P subscales, except the DA subscale, were associated with total PedsQL score and most of its factors. The problem with the DA subscale, as mentioned above, might be related to the low prevalence of such sleep problems in our general population. Surprisingly, SBD subscale also showed low correlation with quality-of-life factors in comparison with other subscales. It is possible that parents did not consider SBD as harmful for their children and/or under-reported it [18]. Also, our study sample was from a non-clinical population and SBD is not frequent in school-aged children of our population, which might affect the results [15,19].

There are some limitations in our study. The study was performed in a non-clinical population and the psychometric properties of the SDSC-P in a clinical setting are yet to be evaluated. Further, the SDSC may have different item distribution, yielding a different factorial structure in our society, and a larger sample size is required for factor analysis of the SDSC in our population, which is worthwhile.

In summary, we created the Persian version of the SDSC for detecting sleep disorders among Iranian children with Persian language. The overall psychometric properties of the SDSC-P, including the internal consistency and convergent validity, seem to be appropriate in our population. However, further studies in a larger and more heterogeneous sample of children, as well as in clinical settings, are warranted for better evaluation of the psychometric properties of the SDSC-P in Iranian population including its factors.

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### Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <http://dx.doi.org/10.1016/j.sleep.2014.03.021>.

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